Shanmuga Industries Arts & Science College
T.V.Malai

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Fit the quadratic curve $Y = ax^2 + bx + c$ for the following data :

X	1	2	3	4	5
Y	2	6	7	8	10

17. Derive Chebyshev's Inequality and explain its significance.

18. A biased coin has a probability of 0.6 for getting heads. Find the probability of getting exactly 3 heads in 5 flips using the Binomial distribution

19. The heights (in cm) of 100 students in a school are normally distributed with a mean of 150 cm and a standard deviation of 15 cm. Find the percentage of students having heights between 135 cm and 165 cm.

20. In an experiment, three different fertilizers were tested on four different types of crops. The following yield data was obtained :

Fertilizer	Crop 1	Crop 2	Crop 3	Crop 4
A	20	22	19	23
B	25	27	26	28
C	30	32	31	33

Conduct a two-way ANOVA to check for statistical significance,

APRIL/MAY 2025

23UECS42A/23UESC42A — STATISTICAL METHODS AND THEIR APPLICATIONS – II

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define curve fitting.
2. Write the normal equations for fitting a straight line using the least squares method.
3. Define probability.
4. What is conditional probability?
5. Define Poisson distribution.
6. What are the properties of a normal distribution?
7. What is the p-value in hypothesis testing?
8. Define Type I and Type II errors.
9. What is the purpose of ANOVA?
10. Define replication in experimental design.

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions.

11. (a) Fit a straight-line equation $Y = ax + b$ for the given data using the least squares method :

x	1	2	3	4	5
y	2	3	5	7	11

Or

(b) Describe the method to fit a second-degree polynomial.

12. (a) A bag contains 3 red balls and 5 blue balls. Two balls are drawn randomly. Find the probability that both balls are red.

Or

(b) Explain Bayes' Theorem with an example.

13. (a) Derive the mean and variance of a binomial distribution.

Or

(b) If the number of phone calls received at a call center follows a Poisson distribution with an average rate of 4 calls per hour, find the probability that exactly 2 calls will be received in an hour.

14. (a) Explain the small sample test for the mean.

Or

(b) A sample of 25 students had a mean score of 80 and a standard deviation of 10. Test whether the sample represents the population with a mean of 75 at a 5% significance level (Use t-test).

15. (a) Three machines produce the following outputs :

Machine	A	B	C
Output	10	12	14
	9	11	13
	10	13	15

Perform a one-way ANOVA test to check if there is a significant difference between the machines.

Or

(b) Describe the completely randomized design (CRD).

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